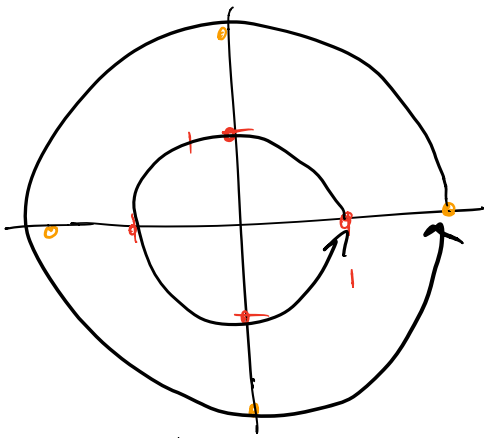
7.1 Parametric Equations

Ex: $x = \cos t$

$y = \sin t$

t	$x = 3\cos t$	$y = 3\sin t$	(x, y)
0	1	0	$(1, 0)$
$\frac{\pi}{2}$	0	1	$(0, 1)$
π	-1	0	$(-1, 0)$
$\frac{3\pi}{2}$	0	-1	$(0, -1)$

$3\times$



$0 \le t \le 2\pi$

eliminate the parameter (t)

$$x^2 + y^2 = (\cos t)^2 + (\sin t)^2 = \cos^2 t + \sin^2 t = 1$$

Cartesian eqn: $x^2 + y^2 = 1$

Ex 2: $x = 3\cos t$

$y = 3\sin t$

Problem (a) Make table

(b) Eliminate t.

(b) $$x^2 + y^2 = (3\cos t)^2 + (3\sin t)^2$$

$$= 9\cos^2 t + 9\sin^2 t$$

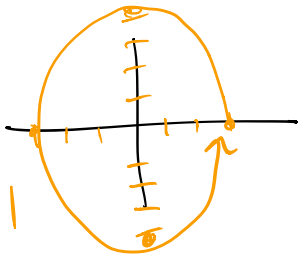
$$= 9(\cos^2 t + \sin^2 t)$$

$$= 9(1)$$

$\sqrt{x^2+y^2}\sqrt{9} = 3$

Ex 3 $x = 3\cos t$

$y = 4\sin t$



$\left(\frac{x}{3}\right)^2 + \left(\frac{y}{4}\right)^2 = 1$

$(\cos t)^2 + (\sin t)^2 \overset{\checkmark}{=} 1$

Ex 4 $x = 3\cos t - 1$

$y = 3\sin t + 2$

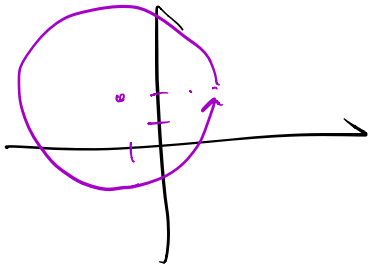
$(x+1)^2 + (y-2)^2 = 9$

check:

$((3\cos t - 1) + 1)^2 + ((3\sin t + 2) - 2)^2$

$(3\cos t)^2 + (3\sin t)^2 = 9$

circle centered at $(-1, 2)$ radius $= 3$



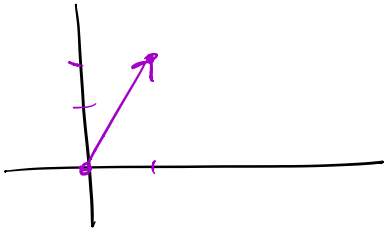
$\sqrt{(x-a)^2 + (y-b)^2} = r$

centered at (a, b), radius r.

Ex 5 lines $x = t$

$y = 2t$

$0 \le t \le 1$

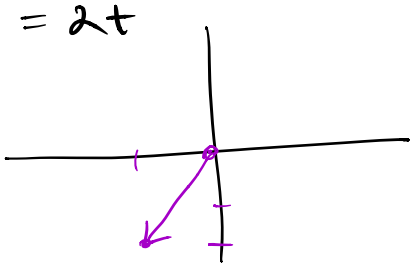


t	x	y
0	0	0
$\frac{1}{2}$	$\frac{1}{2}$	1
1	1	2

Eliminate the parameter: $y = 2(x) = 2x$

Ex 6 $x = -t$ $\quad 0 \le t \le 1$

$y = 2t$



t	x	y
0	0	0
$\frac{1}{2}$	$-\frac{1}{2}$	-1
1	-1	-2

eliminate $y = 2(-x) \Rightarrow y = -2x$

Techniques

1) Table

2) Eliminate the parameter (and look at domain)

3) Geogebra